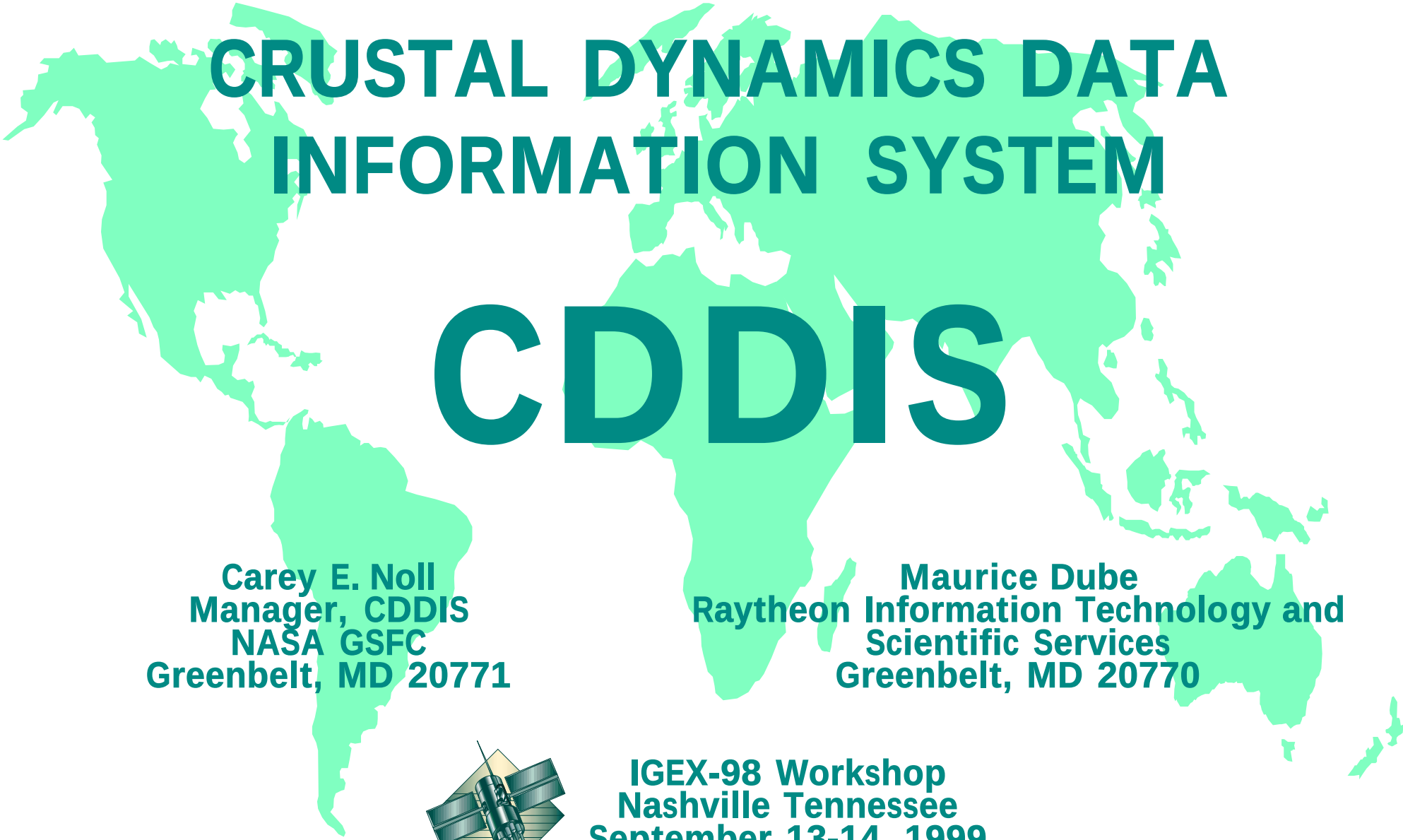

CRUSTAL DYNAMICS DATA INFORMATION SYSTEM

CDDIS

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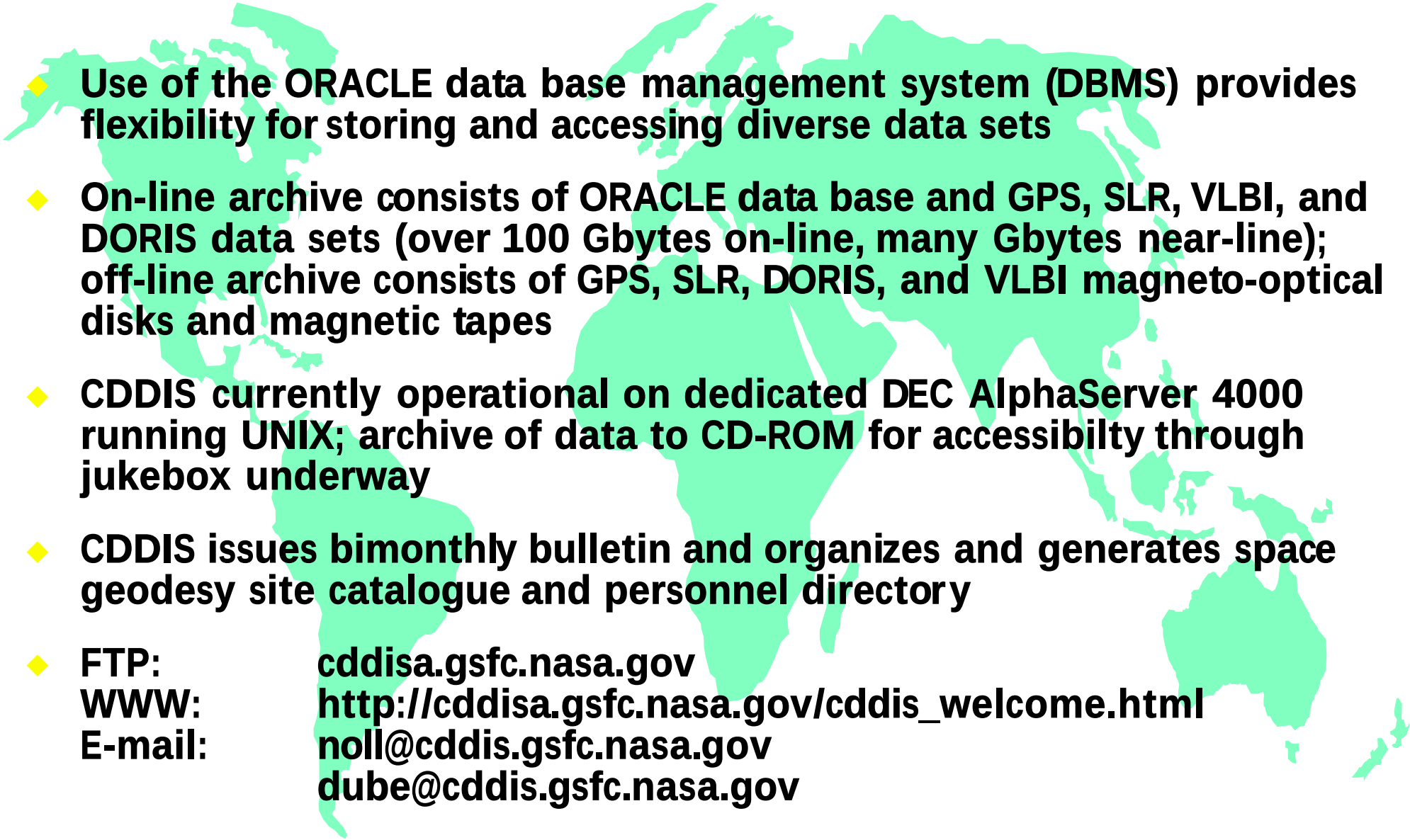
IGEX-98 Workshop
Nashville Tennessee
September 13-14, 1999

CRUSTAL DYNAMICS DATA INFORMATION SYSTEM (CDDIS)

- The CDDIS was established in 1982 as a dedicated data bank to archive and distribute all Crustal Dynamics Project-acquired data and information about these data
- CDDIS continues to serve as the archive and distribution center for space geodesy data, particularly GPS, laser, DORIS, and VLBI data
- CDDIS has served as a global data center for the International GPS Service (IGS) since its start in June 1992, providing on-line access to data from over 160 globally-distributed sites daily
- CDDIS also serves as a data center for GPS and DORIS in support of the International Earth Rotation Service (IERS)
- CDDIS provides on-line archive of TOPEX/Poseidon (SLR and DORIS) and ERS-2 (SLR) data for near real-time access by POD analysis centers
- Selected data sets are accessible to scientists through ftp and WWW; general information about all data are accessible via WWW

CDDIS INTRODUCTION

(Continued)

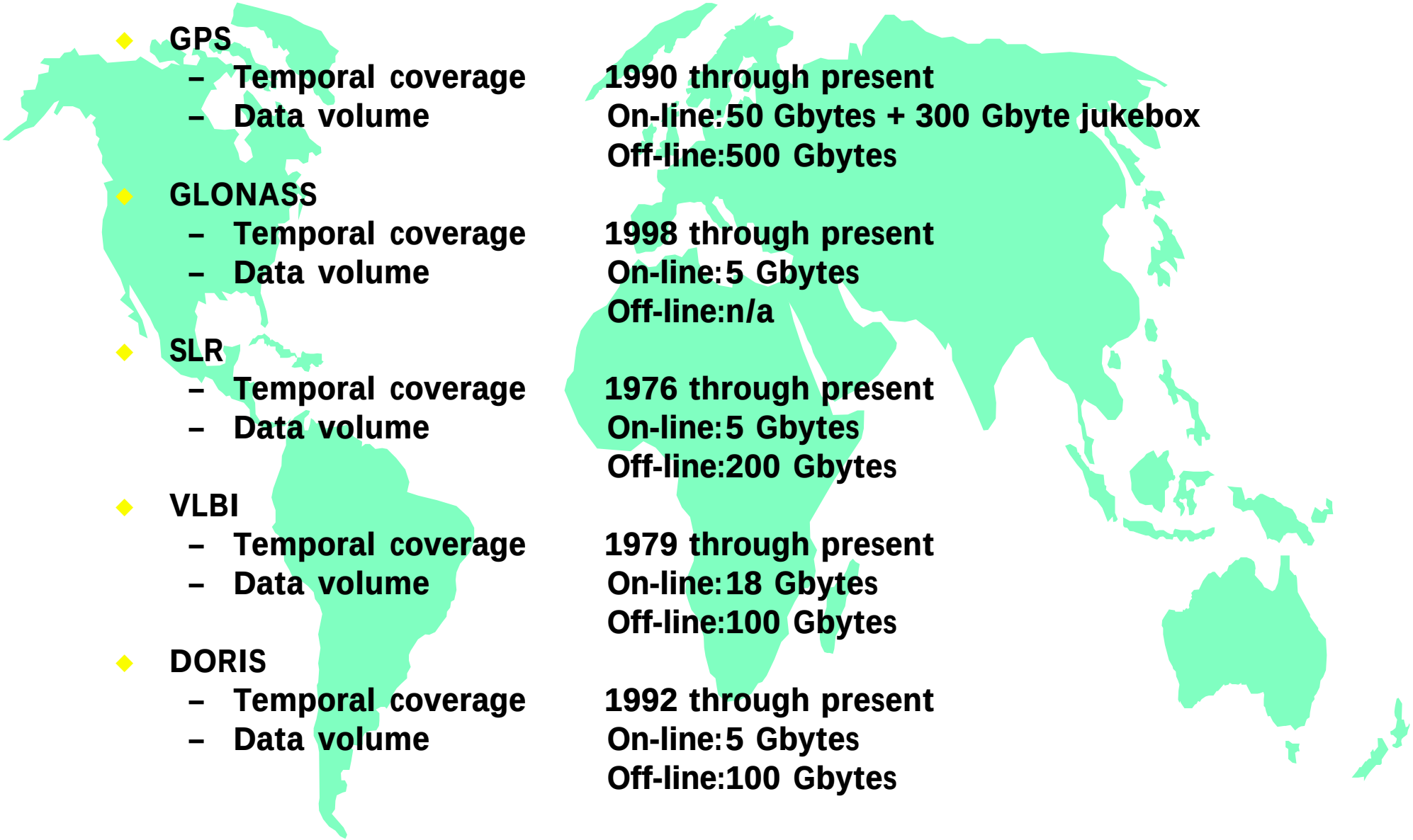


- Use of the ORACLE data base management system (DBMS) provides flexibility for storing and accessing diverse data sets
- On-line archive consists of ORACLE data base and GPS, SLR, VLBI, and DORIS data sets (over 100 Gbytes on-line, many Gbytes near-line); off-line archive consists of GPS, SLR, DORIS, and VLBI magneto-optical disks and magnetic tapes
- CDDIS currently operational on dedicated DEC AlphaServer 4000 running UNIX; archive of data to CD-ROM for accessibilty through jukebox underway
- CDDIS issues bimonthly bulletin and organizes and generates space geodesy site catalogue and personnel directory
- FTP: cddisa.gsfc.nasa.gov
  WWW: http://cddisa.gsfc.nasa.gov/cddis_welcome.html
  E-mail: noll@cddis.gsfc.nasa.gov
  dube@cddis.gsfc.nasa.gov

RECENT DEVELOPMENTS

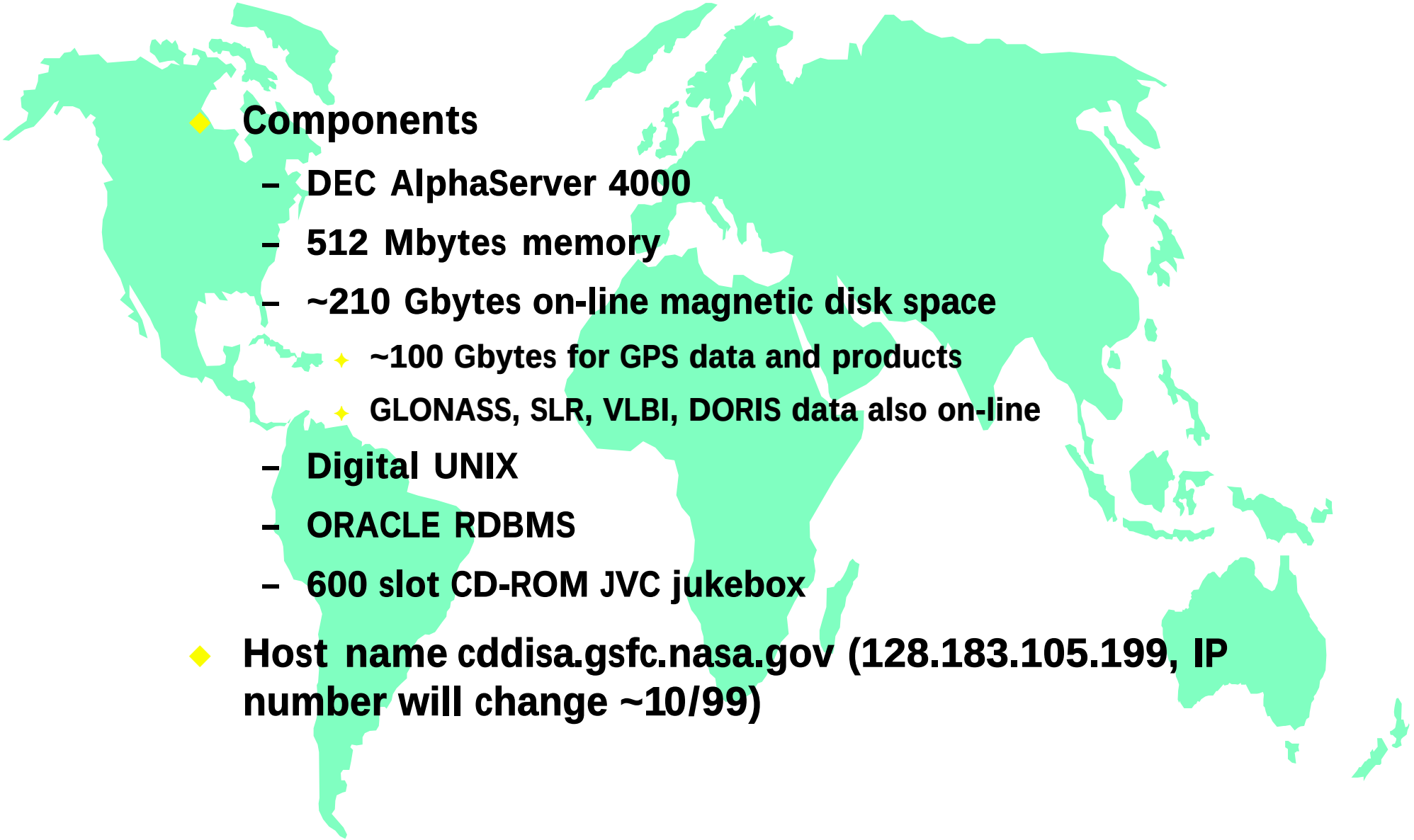
- CDDIS selected to serve as a Global Data Center for the International GLONASS Experiment (IGEX-98)
- CDDIS also selected to serve as Global Data Center for both the International Laser Ranging Service (ILRS) and the International VLBI Service for Geodesy and Astrometry (IVS)
- DEC AlphaServer 4000 (cddisa.gsfc.nasa.gov) was purchased in 1997 and became operational July 1, 1998
- Started migration of GPS data archive from magneto-optical disks to CD-ROM
- Nearly two years of GPS data available on-line; all IGS products (since June 1992) are on-line
- All IGEX GLONASS data and products available on-line
- All SLR (1976-present), DORIS (1992-present), VLBI (1979-present) data holdings currently on-line
- VAX computer (cddis.gsfc.nasa.gov) utilized for tape migration, email, etc.

CDDIS ARCHIVE CONTENTS



- **GPS**
  - Temporal coverage: 1990 through present
  - Data volume: On-line:50 Gbytes + 300 Gbyte jukebox; Off-line:500 Gbytes
- **GLONASS**
  - Temporal coverage: 1998 through present
  - Data volume: On-line:5 Gbytes; Off-line:n/a
- **SLR**
  - Temporal coverage: 1976 through present
  - Data volume: On-line:5 Gbytes; Off-line:200 Gbytes
- **VLBI**
  - Temporal coverage: 1979 through present
  - Data volume: On-line:18 Gbytes; Off-line:100 Gbytes
- **DORIS**
  - Temporal coverage: 1992 through present
  - Data volume: On-line:5 Gbytes; Off-line:100 Gbytes

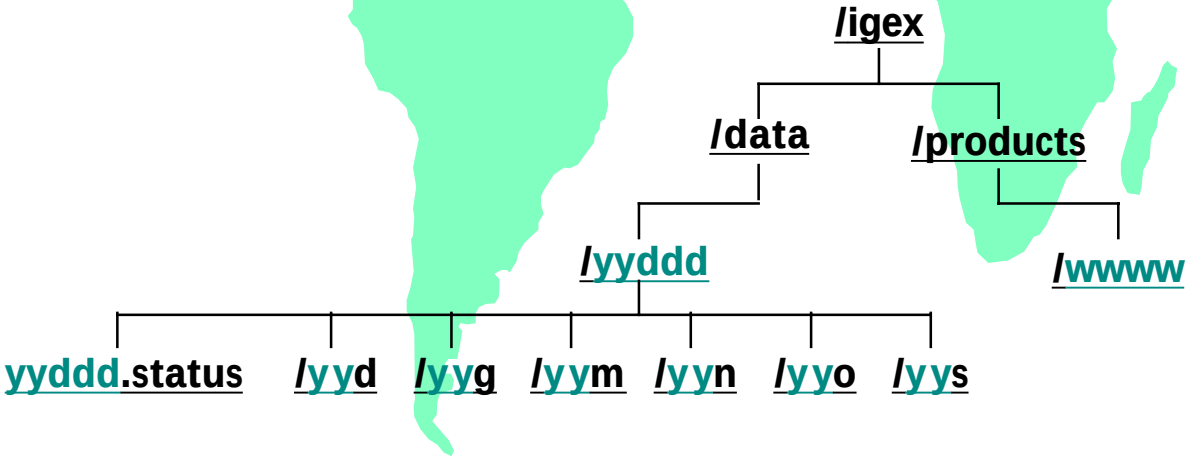
CDDIS HARDWARE CONFIGURATION



- Components
  - DEC AlphaServer 4000
  - 512 Mbytes memory
  - ~210 Gbytes on-line magnetic disk space
    - ~100 Gbytes for GPS data and products
    - GLONASS, SLR, VLBI, DORIS data also on-line
  - Digital UNIX
  - ORACLE RDBMS
  - 600 slot CD-ROM JVC jukebox
- Host name cddisa.gsfc.nasa.gov (128.183.105.199, IP number will change ~10/99)

IGEX DATA AND PRODUCTS

- **GLONASS Data:**
  - Daily files (00:00:00 and 23:59:30 GPS time)
  - 30-second sampling rate
  - Observation, GPS and GLONASS navigation, and optional meteorological data
  - RINEX format
  - Files compressed using Hatanaka and UNIX compression
  - Data from receiver to global data center within 48 hours
- **Directory Structure:**



yy = year
ddd = day of year
wwww = GPS week

d = Hatanaka compressed obs files
g = GLONASS broadcast ephemeris files
m = meteorological data
n = GPS broadcast ephemeris files
o = Compressed observation files
s = teqc summary files

INTERNATIONAL GLONASS EXPERIMENT (IGEX-98) NETWORK

07/21/1999

IGEX-98 GLONASS Data Holdings of the CDDIS

19-Oct-98 through 19-Apr-99

Mon. Name	Site Name	Country	Receiver Type	Start Date	End Date	No. Days	
BELR	Bellevue	Australia	Ashtech GG24C	23-Nov-98	19-Jan-99	27	
BETR	Bellevue	Australia	Ashtech Z-12 (GPS only)	09-Nov-98	19-Jan-99	15	
BISZ	Bishkek	Kyrgyzstan	MAN NR-R124	16-Nov-98	19-Apr-99	147	
BORG	Borowiec	Poland	3S Navigation R100/30T	19-Oct-98	19-Apr-99	167	*
BRST/G	Brest	France	Ashtech GG24 (Martec)	19-Oct-98	16-Apr-99	156	
SUNM	Brisbane	Australia	Javad Legacy GGD	24-Dec-98	03-Apr-99	90	*
BRUG	Brussels	Belgium	3S Navigation R100/30T	19-Oct-98	19-Apr-99	154	*
DLFT	Delft	The Netherlands	Ashtech GG24C	19-Oct-98	16-Feb-99	120	
			Javad Legacy GGD	23-Feb-99	19-Apr-99	53	*
VSLD	Delft	The Netherlands	3S Navigation R100/40T	21-Oct-98	15-Apr-99	165	*
EKAT	Ekaterinburg	Russia	Javad Legacy	13-Jan-99	04-Feb-99	8	
GATR	Gainesville	USA	Javad Legacy GGD	19-Oct-98	03-Apr-99	120	*
GRAC	Grasse	France	Ashtech GG24C	29-Nov-98	19-Apr-99	119	
GRAB	Graz	Austria	Ashtech Z-18	23-Nov-98	19-Apr-99	115	
GTY1	Great Yarmouth	United Kingdom	Trimble 4000SSI (GPS only)	19-Oct-98	30-Jan-99	97	
GTY2	Great Yarmouth	United Kingdom	Ashtech GG24	19-Oct-98	28-Jan-99	74	
GODZ	Greenbelt	USA	Ashtech Z-18	19-Oct-98	19-Apr-99	170	*
HERP	Herstmonceux	United Kingdom	3S Navigation R100/40	03-Nov-98	19-Apr-99	151	*
HOBR	Hobart	Australia	Ashtech GG24C	18-Nov-98	30-Nov-98	3	
HKPU	Hong Kong	China	Ashtech GG24C	20-Oct-98	29-Oct-98	4	
IBK1	Innsbruck	Austria	Ashtech GG24	19-Oct-98	19-Apr-99	120	
IRKG	Irkutsk	Russia	Trimble 4000SGL	19-Oct-98	10-Apr-99	169	*
IRKZ	Irkutsk	Russia	Ashtech Z-18	19-Oct-98	19-Apr-99	174	*
3SNA	Irvine	USA	3S Navigation R100/40T	19-Oct-98	19-Apr-99	139	
KHAB	Khabarovsk	Russia	Ashtech Z-18	19-Oct-98	20-Mar-99	150	*
KR0G	Kiruna	Sweden	Ashtech Z-18	19-Oct-98	19-Apr-99	170	*
CSN1	Korolev	Russia	Ashtech Z-12 (GPS only)	25-Oct-98	25-Oct-98	1	
REUN	La Reunion	La Reunion	Ashtech Z-18	15-Dec-98	19-Apr-99	64	
LDS1	Leeds	United Kingdom	ESA/ISN GNSS	19-Oct-98	19-Apr-99	181	
LDS2	Leeds	United Kingdom	Trimble 4000SSE (GPS only)	20-Oct-98	19-Apr-99	178	
LDS3	Leeds	United Kingdom	Ashtech GG24EC	19-Oct-98	19-Apr-99	180	
SL1X	Lexington	USA	Ashtech Z-18	19-Oct-98	18-Apr-99	172	
LINR	Lindfield	Australia	3S Navigation R100/30T	19-Oct-98	19-Apr-99	90	*
MR6G	Maartsbo	Sweden	Ashtech GG24C	19-Oct-98	19-Apr-99	177	*
MAGD	Magadan	Russia	Javad Legacy	13-Jan-99	10-Mar-99	54	
MTBG	Mattersburg	Austria	Ashtech GG24C	05-Nov-98	17-Apr-99	137	*
MDOA	McDonald	USA	Javad Legacy	20-Nov-98	19-Apr-99	138	
CRAR	McMurdo	Antarctica	Javad Legacy GGD	26-Dec-98	06-Feb-99	43	
MDVG	Mendeleevo	Russia	Trimble 4000SGL	19-Oct-98	14-Feb-99	118	
MDVZ	Mendeleevo	Russia	Ashtech Z-18	19-Oct-98	19-Apr-99	181	*
METZ	Metsahovi	Finland	Ashtech Z-18	19-Oct-98	19-Apr-99	137	*
MTKA	Mitaka	Japan	Ashtech Z-18	27-Oct-98	19-Apr-99	127	*
STRR	Mt. Stromlo	Australia	Ashtech Z-18	07-Nov-98	19-Apr-99	123	*
NKLG	N'Koltang	Gabon	Ashtech Z-18	13-Feb-99	19-Apr-99	37	
BLVA	Neubiberg	Germany	3S Navigation R100/R101	19-Oct-98	21-Dec-98	10	
NTZ1	Neustrelitz	Germany	3S Navigation R101	19-Oct-98	19-Apr-99	183	*
NTZ3	Neustrelitz	Germany	Rogue SNR-8100 (GPS only)	19-Oct-98	19-Apr-99	183	*
NPLI	New Delhi	India	3S Navigation GNSS-300T	16-Nov-98	26-Nov-98	2	
DLRA	Oberpfaffenhofen	Germany	3S Navigation R100/40T	19-Oct-98	19-Apr-99	132	
OS0G	Onsala	Sweden	Ashtech Z-18	22-Oct-98	18-Apr-99	163	*
PKST	Petropavlovsk-Kamchatskiy	Russia	Javad Legacy	16-Jan-99	14-Feb-99	28	
CSIR	Pretoria	South Africa	3S Navigation R100/30T	19-Oct-98	19-Apr-99	165	*
REYZ	Reykjavik	Iceland	Ashtech Z-18	19-Oct-98	18-Apr-99	85	*
RIOZ	Rio Grande	Argentina	MAN NR-R124	11-Nov-98	19-Apr-99	141	
SANG	Santiago	Chile	3S Navigation R100/40	05-Nov-98	19-Apr-99	156	
BIPD	Sèvres	France	3S Navigation R100/30T	25-Oct-98	18-Apr-99	144	*
SUTG	Sutherland	South Africa	MAN NR-R124	03-Dec-98	19-Apr-99	136	
SVT3	Svetloe	Russia	Javad Legacy GGD	05-Jan-99	07-Feb-99	34	
CK02	Taiwan	Taiwan	Ashtech Z-12 (GPS only)	20-Oct-98	19-Apr-99	125	
NCKU	Taiwan	Taiwan	Ashtech GG24	20-Oct-98	17-Apr-99	117	
NPLB	Teddington	United Kingdom	Ashtech Z-12	27-Nov-98	30-Nov-98	4	
NPLC	Teddington	United Kingdom	3S Navigation R100/40T	21-Oct-98	19-Apr-99	131	
THU2	Thule	Greenland	Ashtech Z-18	10-Nov-98	19-Apr-99	112	*
TSKA	Tsukuba	Japan	Ashtech Z-18	19-Nov-98	19-Apr-99	136	
LRBA	Vernon	France	Ashtech Z-18	21-Oct-98	19-Apr-99	138	
VS0G	Visby	Sweden	Ashtech GG24C	19-Oct-98	19-Apr-99	169	*
USNX	Washington, DC	USA	3S Navigation R100/30T	22-Oct-98	19-Apr-99	166	*
WTZG	Wettzell	Germany	3S Navigation R100/R101	19-Oct-98	19-Apr-99	123	*
WTZZ	Wettzell	Germany	Ashtech Z-18	07-Feb-99	19-Apr-99	68	*
YAKT	Yakutsk	Russia	Javad Legacy	12-Jan-99	07-Mar-99	52	
YARR	Yaragadee	Australia	Ashtech Z-18	20-Oct-98	19-Apr-99	137	*
ZIMJ	Zimmerwald	Switzerland	Javad Legacy GGD	14-Feb-99	19-Apr-99	48	*
ZIMZ	Zimmerwald	Switzerland	Ashtech Z-18	19-Oct-98	19-Apr-99	172	*
ZWEG	Zvenigorod	Russia	Ashtech GG24	28-Oct-98	02-Feb-99	79	
Totals:	74 receivers at 62 sites				station days:	8,354	

Notes: * denotes site that continues in operation
47 dual frequency, 20 single frequency, and 7 GPS-only receivers

IGEX-98 SLR Data Holdings of the CDDIS

19-Oct-1998 through 19-Apr-1999

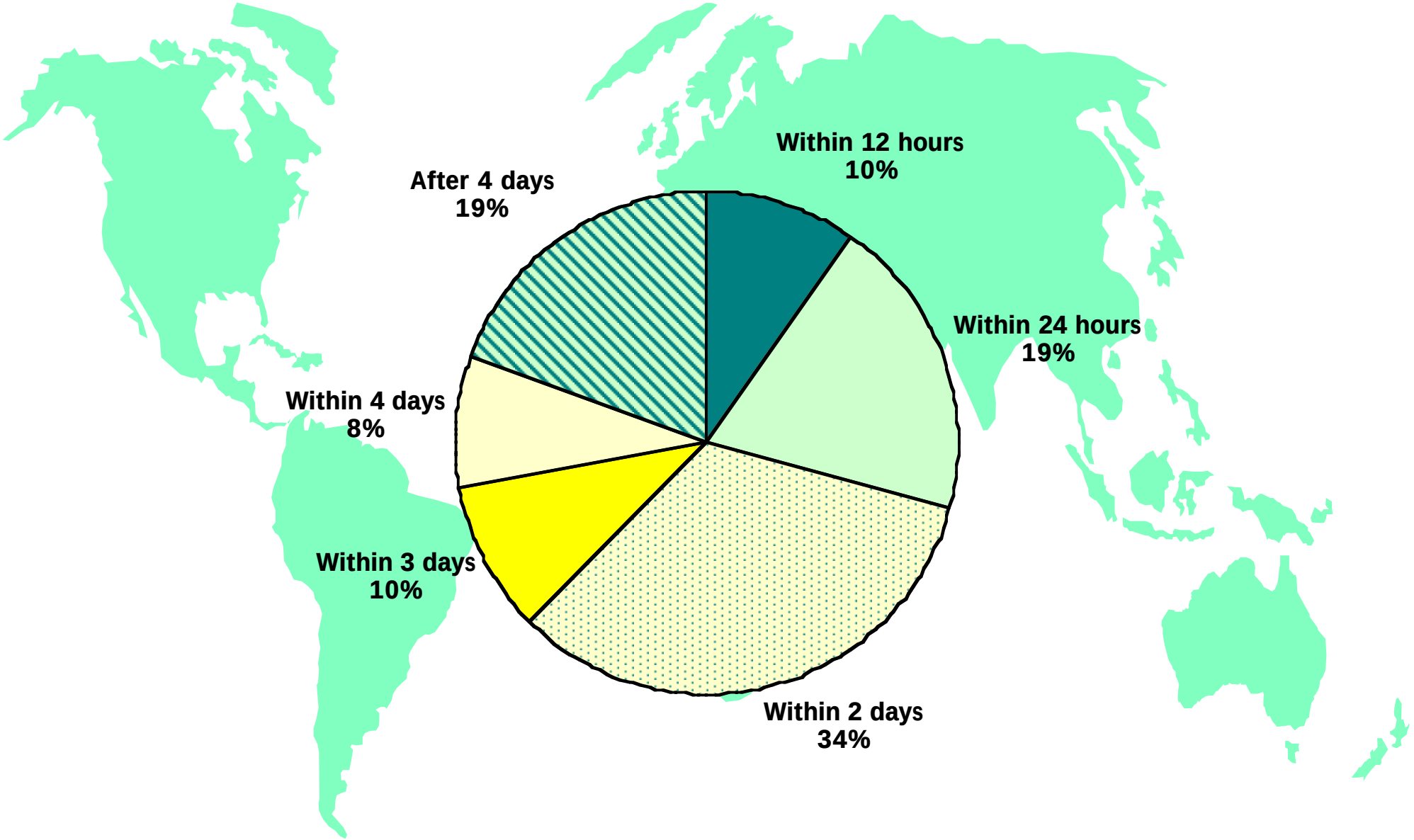
Site Name	Country	Sta.	Number of Passes																		
			GL-62*	GL-64	GL-65*	GL-66*	GL-67	GL-68*	GL-69*	GL-70*	GL-71*	GL-72*	GL-74	GL-75	GL-76	GL-77	GL-79*	GL-80*	GL-81*	GL-82*	Totals
Beijing	China	7249	7	0	0	3	0	6	6	7	6	4	0	0	0	0	0	0	0	0	39
Borowiec	Poland	7811	2	0	0	3	0	1	4	5	5	3	0	0	0	0	3	0	0	0	26
Changchun	China	7237	45	23	8	15	11	37	40	34	36	35	14	20	22	18	27	0	0	1	386
Grasse	France	7835	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Grasse (LLR)	France	7845	66	0	8	77	0	47	60	65	127	82	0	0	0	0	76	0	0	0	608
Graz	Austria	7839	70	8	8	50	0	56	54	64	65	68	4	30	37	43	44	0	0	0	601
Greenbelt	USA	7105	34	0	10	37	0	56	47	49	39	38	0	0	0	0	31	2	13	4	360
Haleakala	USA	7210	29	0	3	44	0	43	18	26	43	18	0	0	0	0	1	0	0	0	225
Herstmonceux	United Kingdom	7840	45	5	5	37	39	50	48	53	48	42	0	0	0	0	41	0	0	0	413
Kashima	Japan	7335	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	4
Koganei	Japan	7328	2	0	0	0	0	2	1	4	6	1	0	0	0	0	1	0	0	0	17
Komsomolsk-na-Amure	Russia	1868	0	0	0	14	0	0	0	0	19	0	0	0	0	0	0	0	0	0	33
Kunming	China	7820	2	1	0	2	0	1	7	5	6	9	0	0	0	1	1	0	0	0	35
Maidanak	Uzbekistan	1864	1	0	0	8	0	8	8	8	12	1	0	1	0	0	5	0	0	0	52
McDonald	USA	7080	27	0	6	39	1	25	27	28	39	22	0	0	0	0	28	0	3	0	245
Metsahovi	Finland	7806	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Miura	Japan	7337	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Monument Peak	USA	7110	112	0	12	88	0	108	123	117	119	110	0	0	0	0	77	4	15	11	896
Mount Stromlo	Australia	7849	68	0	8	72	0	65	63	68	62	68	0	0	0	0	56	1	4	0	535
Orroral	Australia	7843	7	6	5	7	0	5	9	3	8	0	2	10	7	0	9	0	0	0	78
Potsdam	Germany	7836	11	0	1	9	0	12	19	12	12	17	0	0	0	0	8	0	0	0	101
Shanghai	China	7837	22	0	1	11	5	24	22	22	14	28	0	3	2	2	13	0	0	0	169
Simeiz	Ukraine	1873	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
Simosato	Japan	7838	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3
Tahiti	French Polynesia	7124	8	0	0	4	0	4	6	6	3	9	0	0	0	0	1	0	1	0	42
Tateyama	Japan	7339	4	0	0	1	0	5	1	4	2	1	0	0	0	0	1	0	0	0	19
Wettzell	Germany	8834	61	18	3	19	12	49	42	34	42	27	7	25	25	30	23	0	0	0	417
Wuhan	China	7236	2	2	1	0	1	4	3	4	6	1	0	0	0	0	2	0	0	0	26
Yarragadee	Australia	7090	157	0	22	148	0	114	102	121	139	154	0	0	0	0	104	0	12	0	1,073
Zimmerwald	Switzerland	7810	27	0	5	20	0	27	30	34	31	31	0	0	0	0	25	0	0	0	230
Totals:		30	810	63	106	709	69	752	742	775	892	770	27	89	93	94	577	7	48	16	6,639

Site Name	Country	Sta.	Number of Normal Points																		
			GL-62*	GL-64	GL-65*	GL-66*	GL-67	GL-68*	GL-69*	GL-70*	GL-71*	GL-72*	GL-74	GL-75	GL-76	GL-77	GL-79*	GL-80*	GL-81*	GL-82*	Totals
Beijing	China	7249	89	0	0	29	0	46	56	68	67	31	0	0	0	0	0	0	0	0	386
Borowiec	Poland	7811	5	0	0	9	0	3	13	20	18	7	0	0	0	0	9	0	0	0	84
Changchun	China	7237	335	153	35	71	55	258	294	236	275	233	69	131	136	93	154	0	0	4	2,532
Grasse	France	7835	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10
Grasse (LLR)	France	7845	228	0	23	266	0	161	216	218	466	304	0	0	0	0	258	0	0	0	2,140
Graz	Austria	7839	640	66	64	358	0	446	466	595	562	557	47	217	274	316	364	0	0	0	4,972
Greenbelt	USA	7105	174	0	50	215	0	270	264	243	234	249	0	0	0	0	128	12	66	19	1,924
Haleakala	USA	7210	174	0	30	370	0	331	155	177	360	198	0	0	0	0	2	0	0	0	1,797
Herstmonceux	United Kingdom	7840	249	37	12	148	158	235	241	265	249	239	0	0	0	0	191	0	0	0	2,024
Kashima	Japan	7335	0	0	0	0	0	0	3	10	3	0	0	0	0	0	0	0	0	0	16
Koganei	Japan	7328	14	0	0	0	0	7	6	30	40	4	0	0	0	0	9	0	0	0	110
Komsomolsk-na-Amure	Russia	1868	0	0	0	28	0	0	0	0	118	0	0	0	0	0	0	0	0	0	146
Kunming	China	7820	13	5	0	9	0	4	49	22	35	51	0	0	0	6	5	0	0	0	199
Maidanak	Uzbekistan	1864	3	0	0	21	0	17	15	15	81	1	0	3	0	0	13	0	0	0	169
McDonald	USA	7080	139	0	20	181	3	111	120	110	189	114	0	0	0	0	109	0	12	0	1,108
Metsahovi	Finland	7806	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
Miura	Japan	7337	4	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	9
Monument Peak	USA	7110	569	0	46	447	0	611	800	697	681	715	0	0	0	0	398	8	73	60	5,105
Mount Stromlo	Australia	7849	315	0	37	316	0	312	277	291	297	322	0	0	0	0	251	4	24	0	2,446
Orroral	Australia	7843	21	18	19	36	0	18	23	8	25	0	6	42	20	0	22	0	0	0	258
Potsdam	Germany	7836	49	0	5	35	0	67	91	51	66	69	0	0	0	0	36	0	0	0	469
Shanghai	China	7837	196	0	9	93	19	152	220	193	94	282	0	24	19	11	101	0	0	0	1,413
Simeiz	Ukraine	1873	0	0	0	0	0	0	0	0	4	23	0	0	0	0	0	0	0	0	27
Simosato	Japan	7838	0	0	0	7	0	0	7	0	7	0	0	0	0	0	0	0	0	0	21
Tahiti	French Polynesia	7124	37	0	0	19	0	17	31	22	11	39	0	0	0	0	2	0	2	0	180
Tateyama	Japan	7339	19	0	0	4	0	25	4	19	9	8	0	0	0	0	3	0	0	0	91
Wettzell	Germany	8834	249	72	13	81	46	258	177	159	168	153	27	108	98	131	101	0	0	0	1,841
Wuhan	China	7236	21	13	6	0	12	53	30	61	67	8	0	0	0	0	15	0	0	0	286
Yarragadee	Australia	7090	775	0	70	586	0	456	442	506	678	773	0	0	0	0	399	0	60	0	4,745
Zimmerwald	Switzerland	7810	300	0	28	127	0	220	262	225	196	282	0	0	0	0	175	0	0	0	1,815
Totals:		30	4,618	364	467	3,456	293	4,100	4,262	4,241	5,000	4,662	149	525	547	557	2,745	24	237	83	36,330

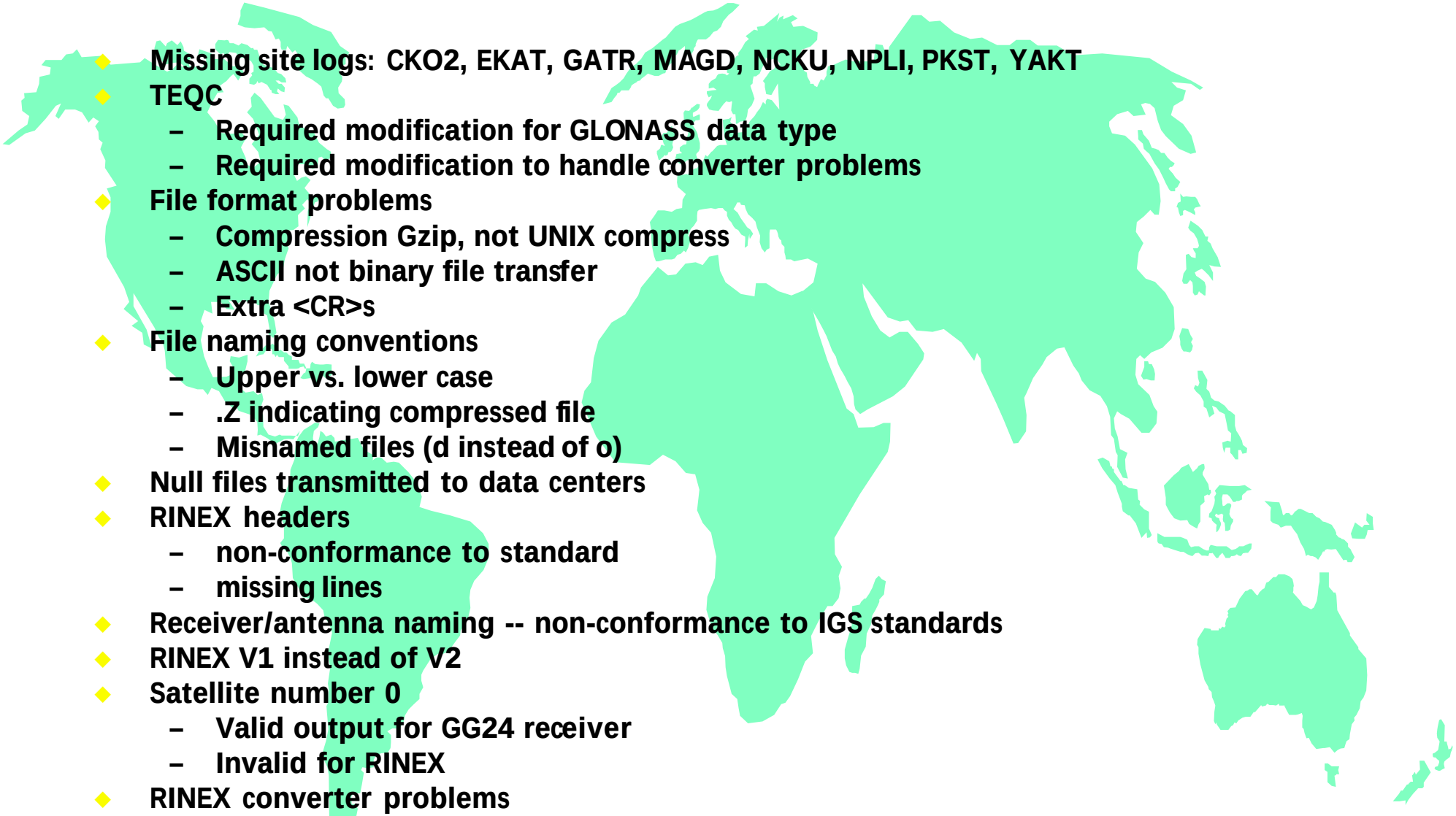
Notes: * indicates GLONASS satellites specifically requested for SLR tracking
GLONASS-65 failed in December 1998
GLONASS-80, -81, -82 launched December 30, 1998

DATA LATENCY

(IGEX-98 Campaign Only)



PROBLEMS ENCOUNTERED



- Missing site logs: CKO2, EKAT, GATR, MAGD, NCKU, NPLI, PKST, YAKT
- TEQC
  - Required modification for GLONASS data type
  - Required modification to handle converter problems
- File format problems
  - Compression Gzip, not UNIX compress
  - ASCII not binary file transfer
  - Extra <CR>s
- File naming conventions
  - Upper vs. lower case
  - .Z indicating compressed file
  - Misnamed files (d instead of o)
- Null files transmitted to data centers
- RINEX headers
  - non-conformance to standard
  - missing lines
- Receiver/antenna naming -- non-conformance to IGS standards
- RINEX V1 instead of V2
- Satellite number 0
  - Valid output for GG24 receiver
  - Invalid for RINEX
- RINEX converter problems
  - Time regression error with 3S converter
  - Field overflow (phase data) in Z-18 converter

CDDIS IGEX-98 PRODUCT HOLDINGS

- Daily orbit files in SP3 format from:
  - BKG - Bundesamt für Kartographie und Geodäsie, Germany
    - Weeks 0980 through present
  - CODE - Center for Orbit Determination, AIUB, Switzerland
    - Weeks 0979 through present
  - ESA/ESOC - European Space Agency Space Operations Center, Germany
    - Weeks 0980 through present
  - GFZ - GeoForschungsZentrum Potsdam, Germany
    - Weeks 0983 through 1001
  - JPL - Jet Propulsion Laboratory, USA
    - Weeks 0991 through present
  - MCC - Mission Control Center, Russia
    - Weeks 0980 through present
  - IGX - Combined IGEX Solution, University of Technology, Vienna, Austria
    - Weeks 0981 through 0989